# User Manual

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# Draco
# KVM Extender

# Model:
# K477 Series

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# 1 About This Manual

## 1.1 Scope

This manual describes how to install your KVM Extender, how to operate it and how to perform trouble shooting.

## 1.2 Validity

This manual is valid for all devices listed on the front page. The product code is printed on the base of the devices.

## 1.3 Cautions and Notes

The following symbols are used in this manual:

This symbol indicates an important operating instruction that should be followed to avoid any potential damage to hardware or property, loss of data, or personal injury.

This symbol indicates important information to help you make the best use of this product.

# 2 Safety Instructions

To ensure reliable and safe long-term operation of your KVM Extender please note the following guidelines:

**Installation**

- ➔ Only use in dry, indoor environments.
- ➔ The KVM Extender and the power supply units can get warm. Do not situate them in an enclosed space without any airflow.
- ➔ Do not place the power supply directly on top of the device.
- ➔ Do not obscure ventilation holes.
- ➔ Only use power supplies originally supplied with the product or manufacturer-approved replacements. Do not use a power supply if it appears to be defective or has a damaged case.
- ➔ Connect all power supplies to grounded outlets. In each case, ensure that the ground connection is maintained from the outlet socket through to the power supply's AC power input.
- ➔ Do not connect the link interface to any other equipment, particularly network or telecommunications equipment.
- ➔ Take any required ESD precautions.

**Repair**

- ➔ Do not attempt to open or repair a power supply unit.
- ➔ Do not attempt to open or repair the KVM Extender. There are no user serviceable parts inside.
- ➔ Please contact your dealer or manufacturer if there is a fault.

# 3 Description

## 3.1 Application

The KVM Extender is used to increase the distance between a source (computer, CPU) and its console (keyboard, mouse, and other peripheral devices).

The KVM Extender is designed for use with Cat X (Twisted Pair) interconnect cables or fiber interconnect cables.

The KVM Extender with Cat X interconnect cables is unsuitable for connection between buildings where a fiber optic based product should be used instead.

The KVM Extender with fiber interconnect cables can also be used with applications in environments which are difficult in electromagnetical aspects. Electromagnetical interference can limit the maximum distance und reliability.

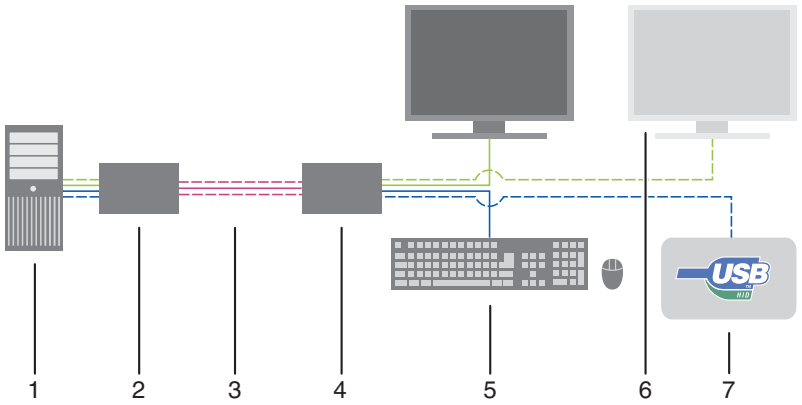
## 3.2 System Overview

The KVM Extender consists of a CPU Unit and a console unit (CON Unit).

The CPU Unit is connected directly to the source (computer, CPU) using the supplied cables.

The CON Unit is connected to the console (monitor, keyboard and mouse).

The CPU Unit and the CON Unit communicate with each other through the interconnect cables.




*System Overview*

1 Source (computer, CPU)

2 KVM Extender CPU Unit

3 Interconnect cable

4 KVM Extender CON Unit

5 Console (monitor, keyboard, mouse)

6 Second monitor (option, only with Dual-Head devices)

7 USB-HID devices (option, only with 4x USB-HID devices)

See Chapter 4.3, Page 32 for installation examples.

## 3.3 Product Range

| Part No. | Description |
|---|---|
| K477-1SHx | Single-Head KVM Extender for 1x DVI-D Single Link (up to 1920x1200), 2x USB-HID |
| K477-1S4xA | Single-Head KVM Extender for 1x DVI-D Single Link (up to 1920x1200), 4x USB-HID and Analog Audio / Serial option |
| K477-1S4xD | Single-Head KVM Extender for 1x DVI-D Single Link (up to 1920x1200), 4x USB-HID and Digital Audio option |
| K477-1STx | Single-Head KVM Extender for 1x DVI-D Single Link (up to 1920x1200), 2x USB-HID, 4x USB 2.0 |
| K477-1SHxV | Single-Head KVM Extender for 1x DVI-I (VGA / DVI) Single Link (up to 1920x1200), 2x USB-HID |
| K477-2S4x | Dual-Head KVM Extender for 2x DVI-D Single Link (up to 1920x1200), 4x USB-HID |

**Part numbers for Connections via Cat X or Fiber Cable**

All mentioned devices are available in the following versions:

- Connection via Cat X cable (x = "C")
- Connection via Multi-mode fiber cable (x = "M")
- Connection via Single-mode fiber cable (x = "S")

**Part numbers for CPU Unit and CON Unit**

The part numbers for the CPU Unit and the CON Unit can be derived from the part number of the complete device.

Example K477-1SHC:

- CPU Unit: **L**477-1SHC
- CON Unit: **R**477-1SHC

All devices of the K477 series are technically compatible to the devices of the K474 Vario series.

## 3.4 Upgrade Kits

| Model | Description |
|---|---|
| 455-4G | 19"/1U rack mount kit to mount up to 4 Single-Head devices |
| 455-8G | 19"/1U rack mount kit to mount up to 4 Dual-Head devices |
| 455-1K | Mounting plate to mount by screws (Single-Head units) |
| 455-2K | Mounting plate to mount by snap on (Single-Head units) |
| 455-1G | Mounting plate to mount by screws (Dual-Head units) |
| 455-2G | Mounting plate to mount by snap on (Dual-Head units) |

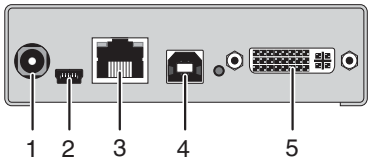
## 3.5 Accessories

| Model | Description |
|---|---|
| 026-2A | Serial cable 1.8 m (RS232) |
| 247-U1 | USB cable 1.8 m (Type A to B) |
| 260-5U | International power supply unit 100...240VAC / 5VDC / 4 A |
| 436-AA | VGA cable 1.8 m (VGA to DVI-I) |
| 436-ID | DVI-D cable 1.8 m (DVI-D) |
| 445-2X | DVI-D splitter cable |
| 455-CK | Stereo jack cable 1.6 m (3.5 mm Stereo) |
| 455-CR | RCA cable 2.5 m (Cinch male connector) |
| 455-CT | TOSLINK cable 1.8 m (F05 male connector) |
| 455-CX | Mini-XLR cable 1.8 m (3 pole) |

# 3.6 Device Views

## 3.6.1 Model K477-1SHC (Single-Head Cat X)

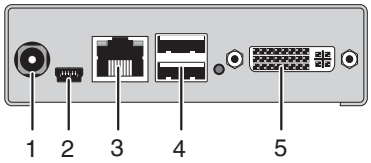
**CPU Unit**




*Rear View*

1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 To CPU: USB-HID
5 To CPU: DVI-D

**CON Unit**

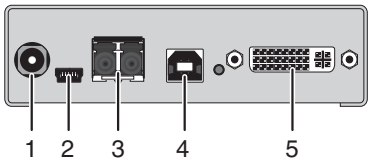



*Rear View*

1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 Connect to USB-HID devices
5 Connect to DVI monitor

## 3.6.2 Model K477-1SHM / -1SHS (Single-Head Fiber)

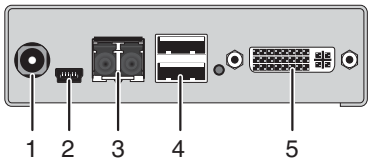
**CPU Unit**




*Rear View*

1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 To CPU: USB-HID
5 To CPU: DVI-D

**CON Unit**

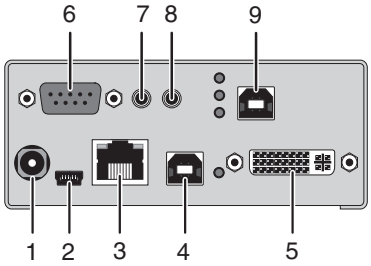



*Rear View*

1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 Connect to USB-HID devices
5 Connect to DVI monitor

## 3.6.3 Model K477-1S4CA (Analog Audio / Serial)

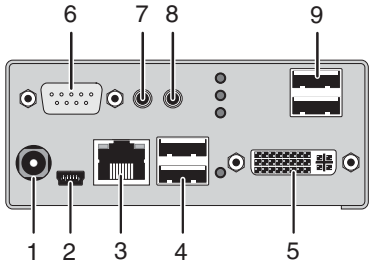
**CPU Unit**




*Rear View*

1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 To CPU: USB-HID 1
5 To CPU: DVI-D
6 Connect to serial (D-Sub 9)
7 Audio IN
8 Audio OUT
9 To CPU: USB-HID 2

**CON Unit**

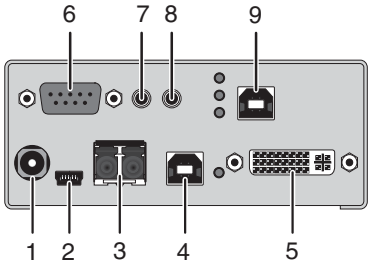



*Rear View*

1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 Connect to USB-HID devices 1
5 Connect to DVI monitor
6 Connect to serial (D-Sub 9)
7 Audio IN
8 Audio OUT
9 Connect to USB-HID devices 2

## 3.6.4 Model K477-1S4MA / -1S4SA (Analog Audio / Serial)

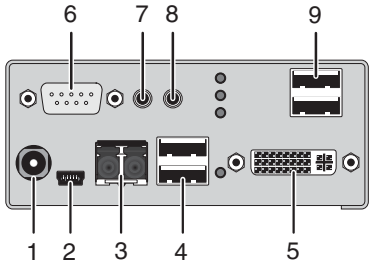
**CPU Unit**




*Rear View*

1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 To CPU: USB-HID 1
5 To CPU: DVI-D
6 Connect to serial (D-Sub 9)
7 Audio IN
8 Audio OUT
9 To CPU: USB-HID 2

**CON Unit**

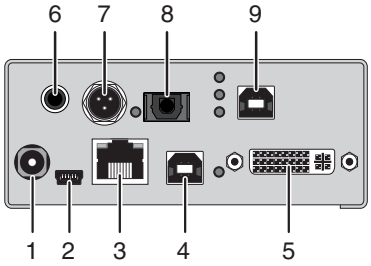



*Rear View*

1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 Connect to USB-HID devices 1
5 Connect to DVI-Monitor
6 Connect to serial (D-Sub 9)
7 Audio IN
8 Audio OUT
9 Connect to USB-HID devices 2

## 3.6.5 Model K477-1S4CD (Digital Audio)

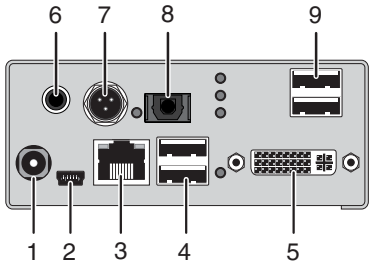
**CPU Unit**




*Rear View*

| | |
|---|---|
| 1 | Connect to 5VDC power supply |
| 2 | Service port |
| 3 | Connect to interconnect cable |
| 4 | To CPU: USB-HID 1 |
| 5 | To CPU: DVI-D |
| 6 | RCA input |
| 7 | Mini-XLR input |
| 8 | TOSLINK input |
| 9 | To CPU: USB-HID 2 |

**CON Unit**

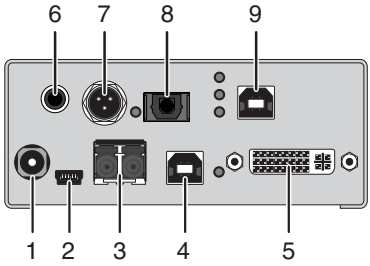



*Rear View*

| | |
|---|---|
| 1 | Connect to 5VDC power supply |
| 2 | Service port |
| 3 | Connect to interconnect cable |
| 4 | Connect to USB-HID devices 1 |
| 5 | Connect to DVI monitor |
| 6 | RCA output |
| 7 | Mini-XLR output |
| 8 | TOSLINK output |
| 9 | Connect to USB-HID devices 2 |

## 3.6.6 Model K477-1S4MD / -1S4SD (Digital Audio)

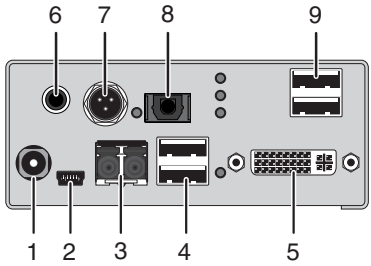
**CPU Unit**




*Rear View*

| | |
|---|---|
| 1 | Connect to 5VDC power supply |
| 2 | Service port |
| 3 | Connect to interconnect cable |
| 4 | To CPU: USB-HID 1 |
| 5 | To CPU: DVI-D |
| 6 | RCA input |
| 7 | Mini-XLR input |
| 8 | TOSLINK input |
| 9 | To CPU: USB-HID 2 |

**CON Unit**

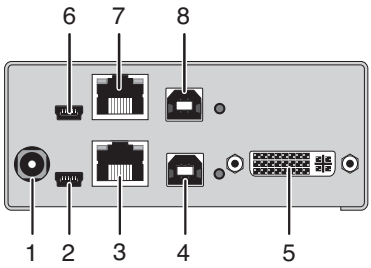



*Rear View*

| | |
|---|---|
| 1 | Connect to 5VDC power supply |
| 2 | Service port |
| 3 | Connect to interconnect cable |
| 4 | Connect to USB-HID devices 1 |
| 5 | Connect für DVI monitor |
| 6 | RCA output |
| 7 | Mini-XLR output |
| 8 | TOSLINK output |
| 9 | Connect to USB-HID devices 2 |

## 3.6.7 Model K477-1STC (USB 2.0 Cat X)

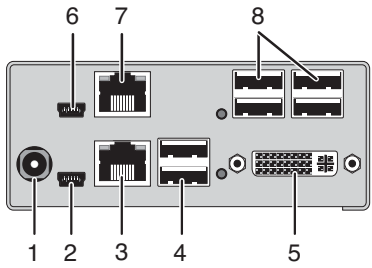
**CPU Unit**




*Rear View*

| | |
|---|---|
| 1 | Connect to 5VDC power supply |
| 2 | Service port 1 |
| 3 | Connect to interconnect cable 1 |
| 4 | To CPU: USB-HID |
| 5 | To CPU: DVI-D |
| 6 | Service port 2 |
| 7 | Connect to interconnect cable 2 |
| 8 | To CPU: USB 2.0 |

**CON Unit**

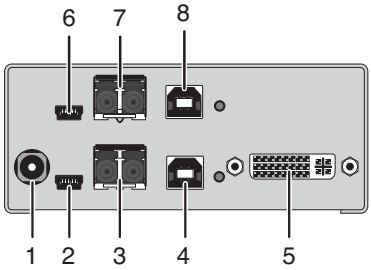



*Front View*

| | |
|---|---|
| 1 | Connect to 5VDC power supply |
| 2 | Service port 1 |
| 3 | Connect to interconnect cable 1 |
| 4 | Connect to USB-HID devices |
| 5 | Connect to DVI monitor |
| 6 | Service port 2 |
| 7 | Connect to interconnect cable 2 |
| 8 | Connect to USB 2.0 devices |

## 3.6.8 Model K477-1STM / -1STS (USB 2.0 Fiber)

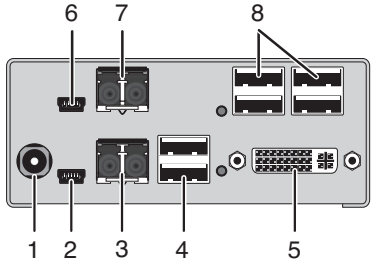
**CPU Unit**




*Rear View*

| | |
|---|---|
| 1 | Connect to 5VDC power supply |
| 2 | Service port 1 |
| 3 | Connect to interconnect cable 1 |
| 4 | To CPU: USB-HID |
| 5 | To CPU: DVI-D |
| 6 | Service port 2 |
| 7 | Connect to interconnect cable 2 |
| 8 | To CPU: USB 2.0 |

**CON Unit**

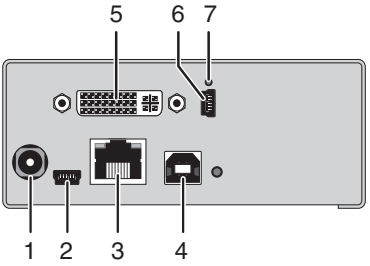



*Front View*

| | |
|---|---|
| 1 | Connect to 5VDC power supply |
| 2 | Service port 1 |
| 3 | Connect to interconnect cable 1 |
| 4 | Connect to USB-HID devices |
| 5 | Connect to DVI monitor |
| 6 | Service port 2 |
| 7 | Connect to interconnect cable 2 |
| 8 | Connect to USB 2.0 devices |

## 3.6.9 Model K477-1SHCV (Single-Head Cat X with VGA)

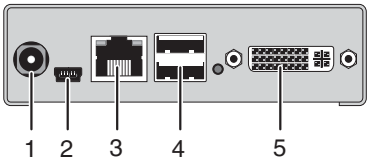
**CPU Unit**




*Rear View*

1 Connect to 5VDC power supply
2 Service port (KVM)
3 Connect to interconnect cable
4 To CPU: USB-HID
5 To CPU: DVI-I (VGA / DVI)
6 Service port (DVI-I)
7 IR receiver for remote control

**CON Unit**




*Rear View*

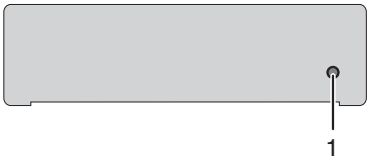
1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 Connect to USB-HID devices
5 Connect to DVI monitor

**CPU Unit**

*Front View*

1 IR receiver for remote control

**CON Unit**

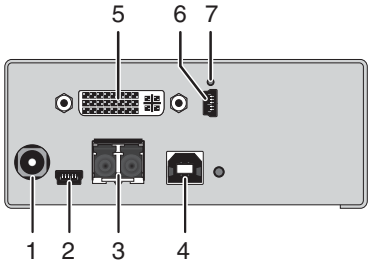



*Front View*

1 IR receiver for remote control

## 3.6.10 Model K477-1SHMV / -1SHSV (Fiber with VGA)

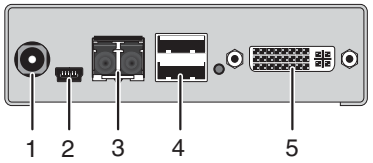
**CPU Unit**




*Rear View*

1 Connect to 5VDC power supply
2 Service port (KVM)
3 Connect to interconnect cable
4 To CPU: USB-HID
5 To CPU: DVI-I (VGA / DVI)
6 Service port (DVI-I)
7 IR receiver for remote control

**CON Unit**




*Rear View*

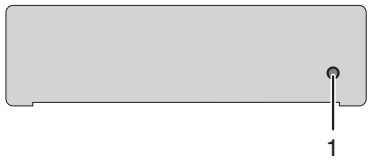
1 Connect to 5VDC power supply
2 Service port
3 Connect to interconnect cable
4 Connect to USB-HID devices
5 Connect to DVI monitor

**CPU Unit**

*Front View*

1 IR receiver for remote control

**CON Unit**

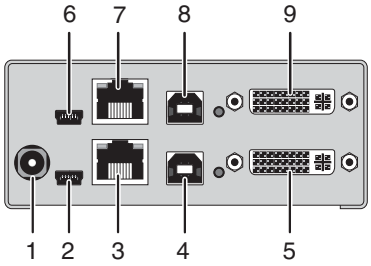



*Front View*

1 IR receiver for remote control

## 3.6.11 Model K477-2S4C (Dual-Head Cat X)

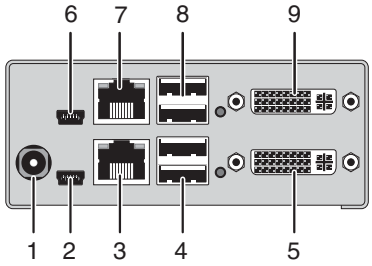
**CPU Unit**




*Rear View*

1 Connect to 5VDC power supply
2 Service port 1
3 Connect to interconnect cable 1
4 To CPU: USB-HID 1
5 To CPU: DVI-D 1
6 Service port 2
7 Connect to interconnect cable 2
8 To CPU: USB-HID 2
9 To CPU: DVI-D 2

**CON Unit**

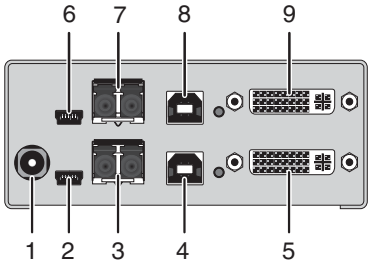



*Rear View*

1 Connect to 5VDC power supply
2 Service port 1
3 Connect to interconnect cable 1
4 Connect to USB-HID devices 1
5 Connect to DVI monitor 1
6 Service port 2
7 Connect to interconnect cable 2
8 Connect to USB-HID devices 2
9 Connect to DVI monitor 2

## 3.6.12 Model K477-2S4M / -2S4S (Dual-Head Fiber)

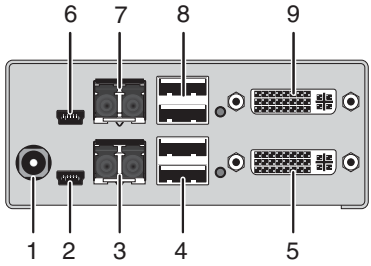
**CPU Unit**




*Rear View*

1 Connect to 5VDC power supply
2 Service port 1
3 Connect to interconnect cable 1
4 To CPU: USB-HID 1
5 To CPU: DVI-D 1
6 Service port 2
7 Connect to interconnect cable 2
8 To CPU: USB-HID 2
9 To CPU: DVI-D 2

**CON Unit**

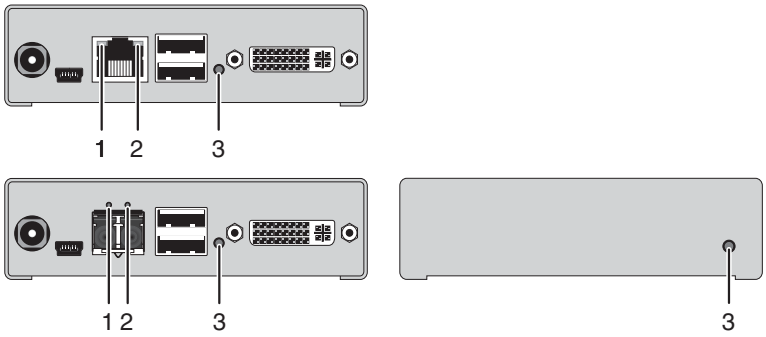



*Rear View*

1 Connect to 5VDC power supply
2 Service port 1
3 Connect to interconnect cable 1
4 Connect to USB-HID devices 1
5 Connect to DVI monitor 1
6 Service port 2
7 Connect to interconnect cable 2
8 Connect to USB-HID devices 2
9 Connect to DVI monitor 2

## 3.7 Status LEDs

The KVM Extender is fitted with a multi color LED on both sides for overall status indication and with two further LEDs on the back side for indication of the connection status.




*Rear View* *Front View*

**LED 1 and 2: Connection Status**

| Pos. | LED | Status | Description |
|---|---|---|---|
| 1 | **Failure LED** (green) | Off | Connection available |
| | | On or Flashing | Connection failure (flashing for about 20 s following a connection failure) |
| 2 | **Status LED** (green) | Flashing | No connection via interconnect cable |
| | | On | Connection available |

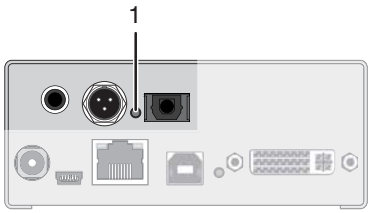
**LED 3: USB and Video Status**

| LED color | Description |
|---|---|
| Dark Red | Device ready |
| Red | Connection available |
| Blue | USB connection available |
| Green | Video available |
| Yellow | Connection and USB signal available, no video |
| Violet | Connection and video signal available, no USB signal |
| Light Blue | USB and video signal available, no connection |
| Turquoise | Connection, USB and video signal available (operating status) |

## 3.7.1 Status Digital Audio (Option)

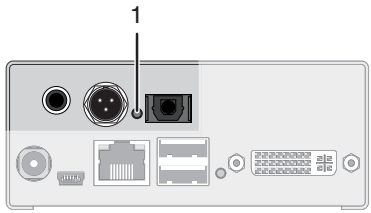
The KVM Extender with optional digital audio is fitted with a further multi-color LED on the rear side for indication of the connection status:

**CPU Unit**




*Rear View*

**CON Unit**




*Rear View*

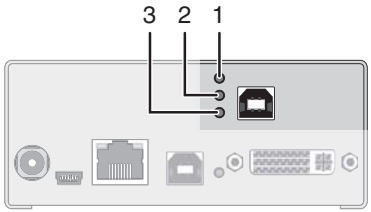
**LED 1: Digital Audio Status**

| LED color | Description |
|---|---|
| Red | No signal |
| Cyan | CPU Unit: RCA signal available |
| Violet | CPU Unit: XLR signal available |
| Blue | CPU Unit: TOSLINK signal available |
| Green | CON Unit: Signal available |

## 3.7.2 Status USB-HID Add-On (Option)

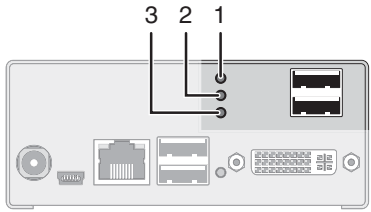
The KVM Extender with optional USB-HID is fitted with three further LEDs on the rear side for indication of the connection status:

**CPU Unit**




*Rear View*

**CON Unit**



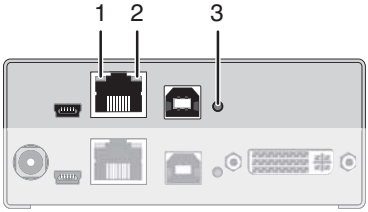

*Rear View*

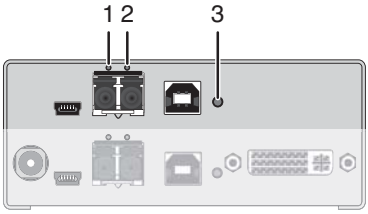
| Pos. | LED | Status | Description |
|---|---|---|---|
| 1, 2 | **Device LED** (orange) | Off | No USB-HID device or not supported USB device connected |
| | | Flashing fast | USB-HID device active |
| | | On | USB-HID device ready or KVM Extender in command mode |
| 3 | **Status LED** (orange) | Off | • No power supply voltage<br>• CPU Unit: KVM Extender in command mode or no connection<br>• CON Unit: Keyboard in command mode |
| | | Flashing slowly | CON Unit: KVM Extender in command mode or no connection |
| | | Flashing fast | Operating status |

## 3.7.3 Status USB 2.0 (Option)

The KVM Extender with optional USB 2.0 is fitted with a multi color LED on both sides for overall status indication and with two further LEDs on the back side for indication of the connection status.

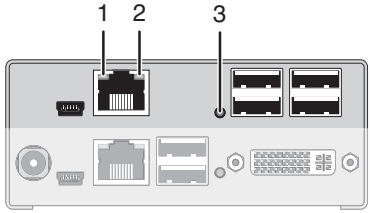
**CPU Unit**

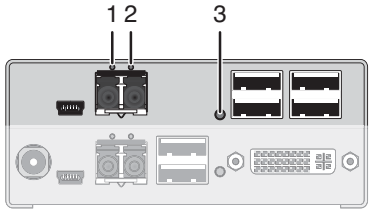



*Rear View*

**CON Unit**




*Rear View*

| Pos. | LED | Status | Description |
|---|---|---|---|
| 1 | **Failure LED** (green) | Off | Connection available |
| | | On or Flashing | Connection failure (flashing for about 20 s following a connection failure) |
| 2 | **Status LED** (green) | Off | No connection via interconnect cable |
| | | On | Connection available |

**LED 3: USB 2.0 Status**

| LED color | Description |
|---|---|
| Red | Device ready |
| Green | Only connection available, no USB 2.0 signal |
| Green/ turquoise flashing | Connection available, no USB 2.0 device connected (only CON unit) |
| Turquoise | Connection and USB 2.0 signal available (operating status) |

## 3.7.4 Status VGA / DVI-I (Option)

The KVM Extender with VGA / DVI-I input is fitted with a multi-color LED on the front side of the CPU Unit for indication of connection status. Further information are available via on screen display (OSD) (see manual for the Media / DVI Converter K238-5V (Download)).

**CPU Unit**

*Front View*

**LED 1: Connection Status VGA / DVI-I**

| LED Farbe | Description |
|---|---|
| Dark Red | No video signal; monitor not detected |
| Red | Video signal not supported; monitor not detected |
| Green | Video signal supported; monitor not detected |
| Blue | No video signal; monitor detected |
| Violet | Video signal not supported; monitor detected |
| Light Blue | Video signal supported; monitor detected |

# 4 Installation

## 4.1 Package Contents

**Your extender package contains the following items:**

- KVM Extender pair (CPU Unit and CON Unit)
- 2x 5VDC international power supply unit
- 2x country specific power cord
- Quick Setup
- DVI video cable (1.8 m, DVI-D male-to-male)

- USB cable (1.8 m, type A to type B)

**Additional content for Dual-Head devices:**

- DVI video cable (1.8 m, DVI-D male-to-male)

- USB cable (1.8 m, type A to type B)

**Additional content for Analog Audio / Serial option:**

- Serial cable (1.8 m, RS232 male connector)

- Stereo jack cable (1,6 m, 3,5 mm male connector)

**Additional content for Digital Audio option:**

- RCA cable (2.5 m, Cinch male connector)

- TOSLINK cable (1.8 m, F05 male connector)

**Additional content for USB-HID Add-On option:**

- USB cable (1.8 m, USB type A to type B)

**Additional content for USB 2.0 Add-On option:**

- USB cable (1.8 m, USB type A to type B)

**Additional content for VGA option (replaces DVI-D cable):**

- VGA cable (1.8 m, VGA male to DVI-I male)

- Infrared remote control

If anything is missing, contact your dealer.

## 4.2 System Setup

First time users are recommended to setup the system with the CPU Unit and the CON Unit in the same room as a test setup. This will allow you to identify and solve any cabling problems, and experiment with your system more conveniently.

➔ Please verify that interconnect cables, interfaces, and handling of the devices comply with the requirements (see Chapter 7, Page 37).

### 4.2.1 KVM Extender Setup

1. Switch off all devices.

**CON Unit Installation**

2. Connect your monitor(s), keyboard and mouse to the CON Unit.
3. Connect the CON Unit with the interconnect cable(s).
4. Connect the 5VDC power supply to the CON Unit.

**CPU Unit Installation**

5. Connect the source (computer, CPU) with the supplied cables to the CPU Unit. Please ensure the cables are not strained.
6. Connect the CPU Unit to the interconnect cable(s).
7. Connect the 5VDC power supply to the CPU Unit.
8. Power up the system.

To power up the system, the following sequence is recommended: Monitor – CON Unit – CPU Unit – source.

The KVM Extender with VGA / DVI-I input is connected as mentioned above. For a complete and detailed description of the setup and configuration of the VGA option, see the manual of the Media- / DVI-Converter K238-5V (Download).

## 4.2.2 Setup of Optional Modules

The modules can be hot plugged.

**Analog Audio / Serial Option:**

1. Connect the audio source with the CPU Unit (e.g. CPU audio output with audio input, CPU audio input with audio output).
2. Connect the audio output at the CON Unit with headphones or suitable speakers.
3. Connect the audio input at the CON Unit with a suitable microphone.

**Digital Audio Option:**

1. Connect the digital audio source with the suitable audio input of the CPU unit.
2. Connect the audio output of the CON Unit with suitable speakers or audio amplifiers.

If several active sources are connected, Mini-XLR input takes priority. The audio signal is available at all outputs.

**USB-HID Add-On Option:**

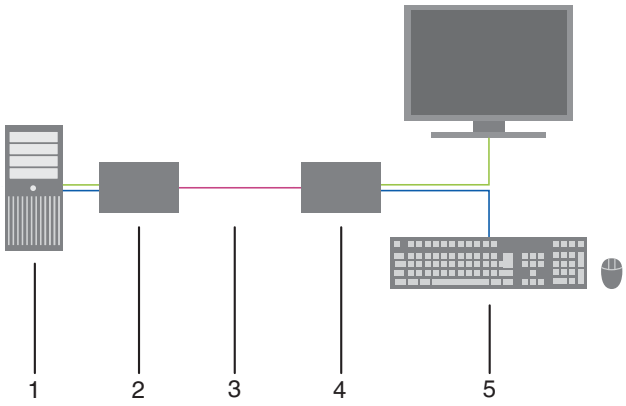
1. Connect the CPU with the CPU Unit (USB-HID 2).
2. Connect the USB-HID devices with the CON Unit (Connect to USB-HID devices 2).

**USB 2.0 Add-On Option:**

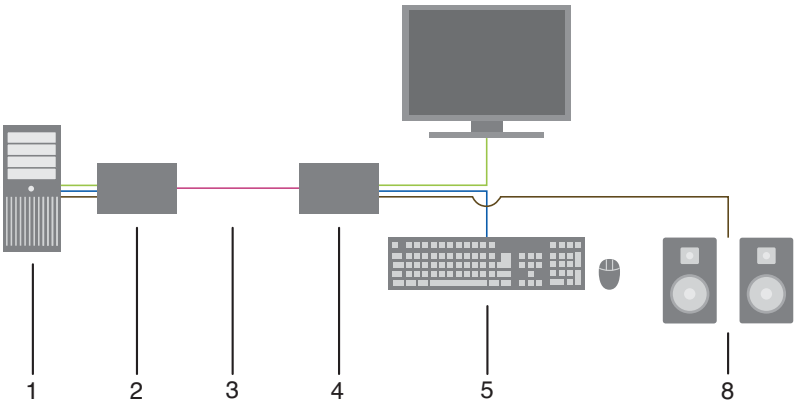
1. Connect the CPU with the CPU Unit (USB 2.0).
2. Connect the USB 2.0 devices with the CON Unit (Connecto to USB 2.0 devices).

## 4.3 Example Applications

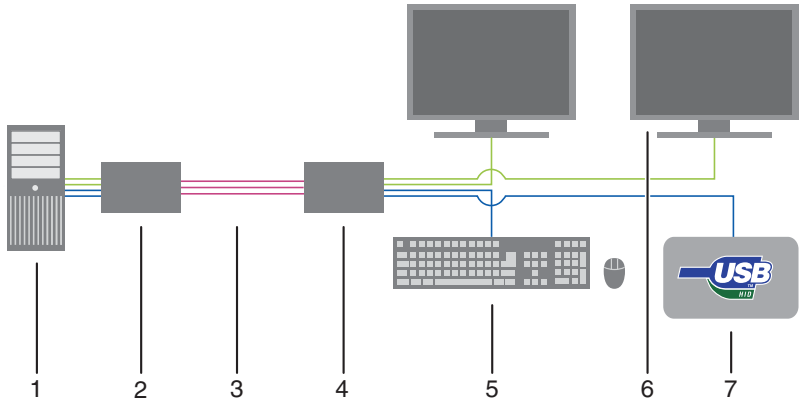
This section illustrates typical installations of KVM Extenders:




*KVM Extender (Single-Head)*




*KVM Extender (Single-Head with Digital / Analog Audio)*




*KVM Extender (Dual-Head with 4x USB-HID)*

1 Source (computer, CPU)
2 KVM Extender CPU Unit
3 Interconnect cable
4 KVM Extender CON Unit
5 Console (monitor, keyboard, mouse)
6 Second monitor (option, only with Dual-Head devices)
7 USB-HID devices (option, only with 4x USB-HID devices)
8 Audio sink (optional, only with devices with Analog Audio / Serial option or Digital Audio option)

# 5 Configuration

## 5.1 Transmission Parameters

The device operates with a proprietary compression method.

In default configuration, the device adapts dynamically to monitor resolution and image content. This configuration is suitable for almost all conditions and should only be modified if image quality is not fully satisfactory.

In exceptional cases there can appear detached "frame droppings" (loss of single pictures) or color effects.

## 5.2 DDC Settings

By default, the device sends the factory preset DDC information to the CPU. This information is suitable in most cases.

The download of the DDC information of the console monitor can be performed during normal operation (see Chapter 6.1, Page 36).

For special requirements, DDC information can be retrieved and uploaded as a binary file at both the CPU Unit and the CON Unit.

Connect your computer with a USB Mini cable to the service port of the CPU Unit or CON Unit.

The data area of the unit is now accessible as a flash drive "Extender".

**Uploading DDC Information**

Copy the binary file containing your specific DDC information to the flash drive of the CPU Unit or CON Unit.

The current DDC information is replaced.

**Retrieving DDC Information**

Copy the file "DDC-EDID.bin" on the flash drive of the CPU Unit to your computer.

To open the binary file, you have to install a suitable software, e.g. WinDDCwrite (Download), on your computer.

**Reset to Factory DDC Information**

Delete the file called "DDC-EDID.bin" on the flash drive of the CPU Unit.

By deleting this file, the factory DDC Information is restored.

## 5.3 Command Mode

During normal use, the console keyboard functions in the usual manner. However, for all KVM Extenders with USB-HID support, you can set the keyboard into a Command Mode by using a specific 'Hot Key' sequence. While in Command Mode, several functions are performed via keyboard commands. To exit Command Mode, press <Esc>.

While in Command Mode, the LEDs **Shift** and **Scroll** on the console keyboard will flash.

In Command Mode normal keyboard and mouse operation will cease. Only selected keyboard commands are available.

The following table lists the keyboard commands to enter and to exit Command Mode and to change the 'Hot Key' sequence:

| Function | Keyboard Command |
|---|---|
| Enter Command Mode (default) | 2x <Left Shift> ('Hot Key') |
| Exit Command Mode | <Esc> |
| Change 'Hot Key' sequence | <Left Ctrl> + <Left Shift> + <c>, <'Hot Key' Code>, <Enter> |

<Key> + <Key> Press keys simultaneously
<Key>, <Key> Press keys successively
2x <Key> Press key quickly, twice in a row (similar to a mouse double-click)

The 'Hot Key' sequence to enter Command Mode can be changed. The following table lists the 'Hot Key' Codes for the available key sequences:

| 'Hot Key' Code | 'Hot Key' |
|---|---|
| 1 | <Left Ctrl> + <Left Shift> + <i> |
| 2 | 2x <Scroll> |
| 3 | 2x <Left Shift> |
| 4 | 2x <Left Ctrl> |
| 5 | 2x <Left Alt> |
| 6 | 2x <Right Shift> |
| 7 | 2x <Right Ctrl> |
| 8 | 2x <Right Alt> |

# 6 Operation

## 6.1 Download of DDC Information

By default, data from the internal DDC list is reported to the source (computer, CPU). If these settings do not lead to a satisfying result, the DDC information of the console monitor can be downloaded and stored internally. The devices have to be configured accordingly (see Chapter 5.2, Page 34).

On all KVM Extenders with USB-HID support, the user can load the DDC information of the console monitor via keyboard command under operating conditions.

1. Enter Command Mode with the 'Hot Key' (see Chapter 5.3, Page 35).
2. Press the key <a> to download the DDC information of the console monitor.

   The screen goes black for a short time.

   At the same time Command Mode is closed and the keyboard LEDs return to previous status.

   The video mode has been readjusted. Screen quality should be optimal. The CPU should now show the console monitor as the current screen, together with the available video resolutions.

   The DDC information of the console monitor was loaded once. Reloading is possible by repeating the operation.

# 7 Specifications

## 7.1 Interfaces

### 7.1.1 DVI-D Single Link

The video interface supports the DVI-D protocol. All signals that comply to DVI-D Single Link norm can be transmitted. This includes e.g. monitor resolutions such as 1920x1200@60Hz, Full HD (1080p) or 2K HD (up to 2048x1152). Data rate is limited to 165 MPixel/s.

### 7.1.2 DVI-I Single Link

The video interface supports the DVI-I protocol. All analog (VGA) or digital (DVI) signals that comply to DVI-I Single Link norm can be transmitted. This includes e.g. monitor resolutions such as 1920x1200@60Hz, Full HD (1080p) or 2K HD (up to 2048x1152). Data rate is limited to 165 MPixel/s.

Transmission of interlaced video signals, such as 1920x1080i, cannot be guaranteed.

### 7.1.3 USB-HID

Our devices with an USB-HID interface support a maximum of two devices compliant with the USB-HID protocol. Each USB-HID port provides a maximum current of 100 mA.

**Keyboard**

Compatible with most USB keyboards. Certain keyboards with additional functions may require custom firmware to operate. Keyboards with an integral USB Hub (Mac keyboards e.g.) are also supported.

**Mouse**

Compatible with most 2-button, 3-button and scroll mice.

**Other USB-HID devices**

The proprietary USB emulation also supports certain other USB-HID devices, such as specific touch screens, graphic tablets, barcode scanners or special keyboards. Support cannot be guaranteed, however, for every USB-HID device.

Only two USB-HID devices are supported concurrently, such as keyboard and mouse or keyboard and touch screen. A hub is allowed, but it does not increase the number of HID devices allowed.
To support other USB 'non-HID' devices, such as scanners, web cams or memory devices, choose our devices with transparent USB support.

### 7.1.4 USB 2.0 (transparent)

KVM Extender models with transparent USB 2.0 support allow the connection of **all** types of USB 2.0 devices (without restriction). USB 2.0 data transfer is supported with USB high speed (max. 480 Mbit/s).

Each USB 2.0 port provides a maximum current of 500 mA (high power).

### 7.1.5 RJ45 (Interconnect)

The communication of the Cat X devices requires a 1000BASE-T connection.

Connector wiring must comply with EIA/TIA-568-B (1000BASE-T), with RJ45 connectors at both ends. All four cable wire pairs are used.

### 7.1.6 Fiber SFP Type LC (Interconnect)

The communication of fiber devices is performed via Gigabit SFPs that have to be connected to suitable fibers fitted with connectors type LC (see Chapter 7.2.2, Page 43).

The correct function of the device can only be guaranteed with SFPs provided by the manufacturer.

SFP modules can be damaged by electrostatic discharge (ESD).
When handling, care must be taken so that the devices are not damaged.

### 7.1.7 Serial Interface

The serial interface option supports a full-duplex transmission with a real hardware handshake up to a Baud rate of 19,200 Baud.

The CON Unit is cabled as DTE (Data Terminal Equipment, like CPU output) and can be connected directly to DCE devices (Data Communication Equipment).

- A touch screen can be connected directly to the CON Unit.
- To connect to a serial printer (or any other DTE instead of DCE device), you need a null modem cable (crossed cable) between CON Unit and the device.

**Operation of several devices:**

The serial interface transmits 6 signals (3 for each direction). Normally, 4 of the 6 signals are handshake signals (in addition to RxD and TxD).

The following configurations, however, can be realized using special adapter splitting cables:

- Three single 2-wire transmissions
- Two transmissions with a handshake signal
- A serial mouse and a single 2-wire transmission.

In this case, choose X-ON / X-OFF software handshake for traffic control at printer and PC.

| | |
|---|---|
| **Connection Format** | DTE (Data Terminal Equipment) |
| **Speed** | Up to 19,200 Baud |
| **Data Format** | Format independent |
| **Data Transmission** | • RxD (Receive Data)<br>• TxD (Transmit Data) |
| **Traffic Control** | The following signals are transmitted (hardware handshake):<br>• RTS (Request To Send)<br>• CTS (Clear To Send)<br>• DTR (Data Terminal Ready)<br>• DSR (Data Set Ready) |

## 7.1.8 Analog Audio Interface

The Analog Audio option supports a bidirectional stereo audio transmission, in nearly CD quality.

The audio interface is a 'line level' interface and it is designed to transmit the signals of a sound card (or another 'line level' device) as well as to allow the connection of active speakers to the CON Unit.

Stereo audio can be transmitted bidirectionally at the same time.

**Connection of a microphone:**

Connect the microphone to the 'audio' input of the CON Unit. There are two ways to establish this connection:

- The output of the CPU Unit is connected with the microphone input of the sound card (red). Adjust the sound card to provide an additional amplification (20 dB).
- The output of the CPU Unit is connected to the audio input of the sound card (blue). Choose this connection if the microphone has its own pre-amplifier.

The CON Unit can do the pre-amplification of the microphone as well. Open the CON Unit, locate the 'MIC' jumper on the audio board and close the pins.

| | |
|---|---|
| **Transmission Format** | Digitized virtually CD quality audio (16 bit, 38.4 KHz) |
| **Signal Level** | Line-Level (5 Volt Pk-Pk maximum) |
| **Input Impedance** | 47 KOhm |
| **Connections CPU Unit** | 2x 3.5 mm stereo jack plug (audio in & audio out) |
| **Connections CON Unit** | 2x 3.5 mm stereo jack plug (audio in & audio out) |

### 7.1.9 Digital Audio Interface

The digital audio option supports the unidirectional transmission of digital audio data.

Up to three sources can be connected to the CPU Unit. The active source is transmitted. If several sources are active, the XLR signal takes priority, otherwise the first active signal.

Up to three sinks can be connected to the CON Unit. The signal is available at all outputs concurrently.

| | |
|---|---|
| **Compatibility** | AES-3, S/PDIF, EIAJ CP1201, IEC-60958 |
| **Standards** | Dolby Digital, DTS, PCM |
| **Scanning Frequency** | 32 to 48 kHz |
| **CPU Unit (Inputs)** | • Mini-XLR (symmetrical, lockable)<br>• Coaxial (RCA, Cinch)<br>• Optical (TOSLINK) |
| **CON Unit (Outputs)** | • Mini-XLR (symmetrical, lockable)<br>• Coaxial (RCA, Cinch)<br>• Optical (TOSLINK) |

# 7.2 Interconnect Cable

## 7.2.1 Cat X

A point-to-point connection is required. Operation with several patch fields is possible. Routing over an active network component, such as an Ethernet Hub, Router or Switch, is not allowed.

➔ Avoid routing Cat X cables along power cables.

➔ If the site has 3-phase AC power, try to ensure that CPU Unit and CON Unit are on the same phase.

To maintain regulatory EMC compliance, correctly installed shielded Cat X cable must be used throughout the interconnection link.

To maintain regulatory EMC compliance, all Cat X cables need to carry ferrites on both cable ends close to the device.

**Type of Interconnect Cable**

The KVM Extender requires interconnect cabling specified for Gigabit Ethernet (1000BASE-T). The use of solid-core (AWG24), shielded, Cat 5e (or better) is recommended.

| | |
|---|---|
| **Cat X Solid-Core Cable AWG24** | S/UTP (Cat 5e) cable according to EIA/TIA-568-B. Four pairs of wires AWG24. Connection according to EIA/TIA-568-B (1000BASE-T). |
| **Cat X Patch Cable AWG26/8** | S/UTP (Cat 5e) cable according to EIA/TIA-568-B. Four pairs of wires AWG26/8. Connection according to EIA/TIA-568-B (1000BASE-T). |

The use of flexible cables (patch cables) type AWG26/8 is possible, however the maximum possible extension distance is halved.

**Maximum Acceptable Cable Length**

| | |
|---|---|
| **Cat X Installation Cable AWG24** | 140 m (400 ft) |
| **Cat X Patch Cable AWG26/8** | 70 m (200 ft) |

## 7.2.2 Fiber

A point-to-point connection is necessary. Operation with multiple patch panels is allowed. Routing over active network components, such as Ethernet Hubs, Switches or Routers, is not allowed.

**Type of Interconnect Cable**

(Cable notations according to VDE)

| Type of cable | Specifications |
|---|---|
| Single-mode 9µm | • Two fibers 9µm<br>• I-V(ZN)H 2E9 (in-house patch cable)<br>• I-V(ZN)HH 2E9 (in-house breakout cable)<br>• I/AD(ZN)H 4E9 (in-house or outdoor breakout cable, resistant)<br>• A/DQ(ZN)B2Y 4G9 (outdoor cable, with protection against rodents) |
| Multi-mode 50µm | • Two fibers 50µm<br>• I-V(ZN)H 2G50 (in-house patch cable)<br>• I/AD(ZN)H 4G50 (in-house or outdoor breakout cable, resistant) |
| Multi-mode 62.5µm | • Two fibers 62.5µm<br>• I-V(ZN)HH 2G62,5 (in-house breakout cable)<br>• A/DQ(ZN)B2Y 4G62,5 (outdoor cable, with protection against rodents) |

**Maximum Acceptable Cable Length**

| Type of cable | Maximum Acceptable Cable Length |
|---|---|
| Single-mode 9µm | 10,000 m (32,800 ft) |
| Multi-mode 50µm (OM3) | 1,000 m (3,280 ft) |
| Multi-mode 50µm | 400 m (1,300 ft) |
| Multi-mode 62.5µm | 200 m (650 ft) |

If you use single-mode SFPs with multi-mode fibers, you normally can double the maximum acceptable cable length.

**Type of Connector**

| | |
|---|---|
| **Connector** | LC Connector |

# 7.3 Supported Peripherals

## 7.3.1 USB-HID Devices

The KVM Extender will support most USB-HID devices, including the vast majority of keyboards and mice currently on the market. Many other kinds of HID device such as bar-code scanners and touch screens may also be compatible

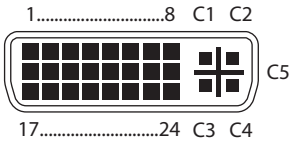
It is not possible to guarantee support for all available USB-HID devices. In certain cases, custom firmware may be required.

USB-HID (and other) devices that are not supported as standard will normally operate with our devices featuring transparent USB support.

Please note that concurrent operation of more than two USB-HID devices is not possible even if you use a USB hub.

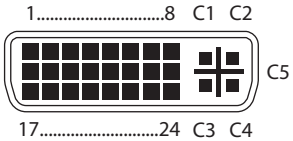
# 7.4 Connector Pinouts

**Connector DVI-D Single-Link**




| Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|
| 1 | T.M.D.S data 2– | 9 | T.M.D.S data 1– | 17 | T.M.D.S data 0– |
| 2 | T.M.D.S data 2+ | 10 | T.M.D.S data 1+ | 18 | T.M.D.S data 0+ |
| 3 | T.M.D.S data 2 GND | 11 | T.M.D.S data 1 GND | 19 | T.M.D.S data 0 GND |
| 4 | n.c. | 12 | n.c. | 20 | n.c. |
| 5 | n.c. | 13 | n.c. | 21 | n.c. |
| 6 | DDC Input (SCL) | 14 | +5VDC high impedance | 22 | T.M.D.S clock GND |
| 7 | DDC Output (SDA) | 15 | GND | 23 | T.M.D.S clock + |
| 8 | Internal use | 16 | Hot Plug recognition | 24 | T.M.D.S clock – |
| | | | | | |
| C1 | Internal use | | | C3 | Internal use |
| C2 | n.c. | C5 | GND | C4 | Internal use |

**Connector DVI-I Single-Link**

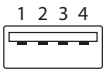



| Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|
| 1 | T.M.D.S data 2– | 9 | T.M.D.S data 1– | 17 | T.M.D.S data 0– |
| 2 | T.M.D.S data 2+ | 10 | T.M.D.S data 1+ | 18 | T.M.D.S data 0+ |
| 3 | T.M.D.S data 2 GND | 11 | T.M.D.S data 1 GND | 19 | T.M.D.S data 0 GND |
| 4 | n.c. | 12 | n.c. | 20 | n.c. |
| 5 | n.c. | 13 | n.c. | 21 | n.c. |
| 6 | DDC Input (SCL) | 14 | +5VDC high impedance | 22 | T.M.D.S clock GND |
| 7 | DDC Output (SDA) | 15 | GND | 23 | T.M.D.S clock + |
| 8 | Internal use | 16 | Hot Plug recognition | 24 | T.M.D.S clock – |
| | | | | | |
| C1 | Internal use | | | C3 | Internal use |
| C2 | n.c. | C5 | GND | C4 | Internal use |

**Connector USB Type B**

| Picture | Pin | Signal | Color |
|---|---|---|---|
| | 1 | VCC (+5VDC) | Red |
| | 2 | Data – | White |
| | 3 | Data + | Green |
| | 4 | GND | Black |

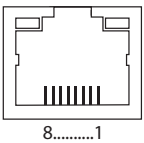
**Connector USB Type A**

| Picture | Pin | Signal | Color |
|---|---|---|---|
|  | 1 | VCC (+5VDC) | Red |
| | 2 | Data – | White |
| | 3 | Data + | Green |
| | 4 | GND | Black |

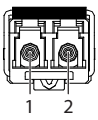
**Connector Mini USB Type B**

| Picture | Pin | Signal | Color |
|---|---|---|---|
| | 1 | VCC (+5VDC) | Red |
| | 2 | Data – | White |
| | 3 | Data + | Green |
| | 4 | n.c. | – |
| | 5 | GND | Black |

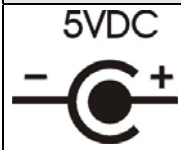
**RJ45**

| Picture | Pin | Signal | Pin | Signal |
|---|---|---|---|---|
|  | 1 | D1+ | 5 | D3– |
| | 2 | D1– | 6 | D2– |
| | 3 | D2+ | 7 | D4+ |
| | 4 | D3+ | 8 | D4- |

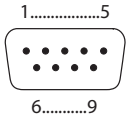
**Fiber SFP Typ LC**

| Picture | Diode | Signal |
|---|---|---|
|  | 1 | Data OUT |
| | 2 | Data IN |

**Power Supply**

| Picture | Pin | Signal |
|---|---|---|
|  | Inside | VCC (+5VDC) |
| | Outside | GND |

**D-Sub 9 (Serial)**

| Picture | Pin | Signal | Pin | Signal |
|---|---|---|---|---|
|  | 1 | n.c. | 6 | DTR |
| | 2 | CTS | 7 | TxD |
| | 3 | RTS | 8 | RxD |
| | 4 | DSR | 9 | n.c. |
| | 5 | GND | | |

**3.5 mm Stereo Jack Plug**

| Picture | Pin | Signal |
|---|---|---|
| | 1 | GND |
| | 2 | Audio IN / OUT L |
| | 3 | Audio IN / OUT R |

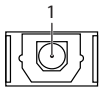
**RCA (Cinch)**

| Picture | Pin | Signal |
|---|---|---|
| | 1 | GND |
| | 2 | Data IN / OUT |

**Mini-XLR**

| Picture | Pin | Signal |
|---|---|---|
| | 1 | GND |
| | 2 | Data + |
| | 3 | Data – |

**TOSLINK**

| Picture | Diode | Signal |
|---|---|---|
|  | 1 | Data IN / OUT |

## 7.5 Power Supply

| | |
|---|---|
| **Voltage** | 5VDC |
| **Power Requirement (per Unit)** | • Single-Head devices: max. 800 mA<br>• Dual-Head devices: max. 1,600 mA<br><br>**Optional Modules:**<br>• Analog Audio / Serial: max. 300 mA<br>• Digital Audio: max. 300 mA<br>• USB-HID: max. 300 mA<br>• USB 2.0: max. 2,500 mA<br>• VGA: max. 900 mA |

## 7.6 Environmental Conditions

| | |
|---|---|
| **Operating Temperature** | 41 to 113°F (5 to 45°C) |
| **Storage Temperature** | –13 to 140°F (–25 to 60°C) |
| **Relative Humidity** | Max. 80% non-condensing |

## 7.7 Size

**Single-Head Devices**

| | |
|---|---|
| **CPU Unit / CON Unit** | 103 x 143 x 29 mm (4" x 5.6" x 1.1") |
| **Shipping Box** | 210 x 140 x 165 mm (8.3" x 5.5" x 6.5") |

**Dual-Head Devices and Devices with Optional Modules**

| | |
|---|---|
| **CPU Unit / CON Unit** | 103 x 143 x 43 mm (4" x 5.6" x 1.7") |
| **Shipping Box** | 460 x 250 x 120 mm (18.1" x 9.8" x 4.7") |

## 7.8 Shipping Weight

**Single-Head Devices**

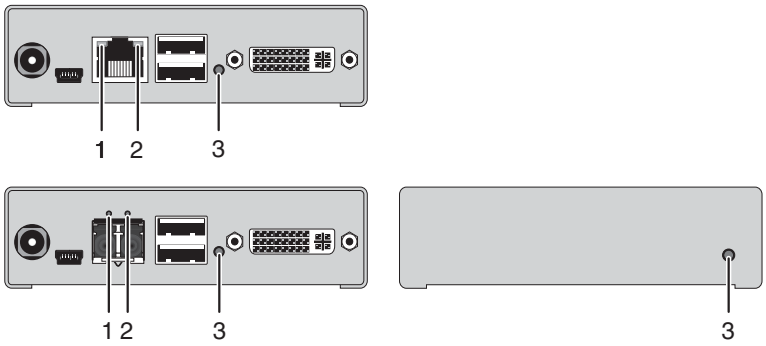
| | |
|---|---|
| **CPU Unit / CON Unit** | 0.3 kg (0.7 lb) |
| **Shipping Box** | 1.8 kg (4.0 lb) |

**Dual-Head Devices and Devices with Optional Modules**

| | |
|---|---|
| **CPU Unit / CON Unit** | 0.4 kg (0.9 lb) |
| **Shipping Box** | 2.3 kg (5.1 lb) |

# 8 Troubleshooting

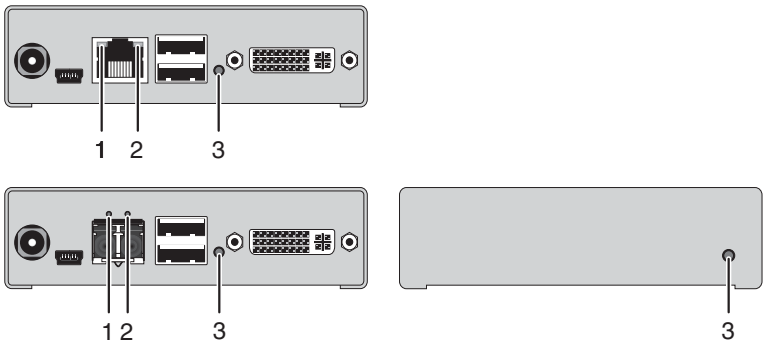
## 8.1 Blank Screen




*Rear View* *Front View*

| Diagnosis | Possible Reason | Measure |
|---|---|---|
| LED **3** off | Power supply | ➔ Check power supply units and the connection to the power network. |
| LED **1** on or LED **2** off | Connection between CON Unit and CPU Unit | ➔ Check interconnect cables and connections. |
| CPU Unit: LED **3** red or yellow | No video signal detected by source (computer, CPU) | ➔ Check DVI-D cable to CPU<br>➔ Download DDC information from console monitors (see Chapter 6.1, Page 36). Reboot CPU if necessary. |
| CON Unit: LED **3** red or yellow | No monitor detected | ➔ Check connection, length and quality of the DVI-D cable to monitor, tighten cable thumbscrews. |
| | No video signal detected from CPU Unit | ➔ Check connection, length and quality of interconnect cables between the units.<br>➔ Download DDC information from console monitors (see Chapter 6.1, Page 36). Reboot CPU if necessary. |

## 8.2 USB-HID




*Rear View* *Front View*

| Diagnosis | Possible Reason | Measure |
|---|---|---|
| Keyboard LEDs **Shift** and **Scroll** are blinking | Keyboard in Command Mode | ➔ Press <Esc> to leave Command Mode. |
| CPU Unit: LED **3** green or violet | No USB connection to CPU | ➔ Check connection of USB cable to CPU; select another USB port if necessary.<br>➔ Remove USB and power cable and restart CPU. Connect power cable first. |
| CON Unit: LED **3** green or violet | Problems with USB connection | ➔ Check connection of USB cable to USB-HID device.<br>➔ Remove DVI and power cable and restart CON Unit. Connect power cable first. |
| USB device without function | No USB-HID device | ➔ Connect USB-HID device. |
| | USB-HID device is not supported | ➔ Contact dealer if necessary. |

## 8.3 Serial Connection

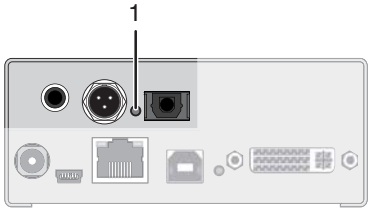
| Diagnosis | Possible Reason | Measure |
|---|---|---|
| Serial device not operational | Settings of the serial interface | ➔ Check Baud rate and general settings. |
| | No serial connection to CPU | ➔ Check connection via serial cable. |
| | No serial connection to end device (e.g. touch screen, keyboard) | ➔ Connect serial end device and switch it on.<br>➔ Check connection via serial cable. |
| Touch screen not operational | Hardware handshake | ➔ Adjust serial interface to X-ON / X-OFF software handshake. |

## 8.4 Analog Audio

| Diagnosis | Possible Reason | Measure |
|---|---|---|
| CON Unit: No signal at audio output | No audio connection to CPU / audio source | ➔ Connect analog audio source.<br>➔ Check audio cable. |
| | No Signal | ➔ Switch analog audio source on.<br>➔ Activate analog output at CPU / audio source. |
| | No audio connection to audio sink (e.g. speakers) | ➔ Connect analog audio sink and switch it on.<br>➔ Check connection of audio cable. |
| CPU Unit: No signal at audio output (microphone) | No audio connection to audio source (microphone) | ➔ Connect analog audio source (microphone).<br>➔ Check connection of audio cable. |
| | No signal | ➔ Switch analog audio source on.<br>➔ Activate analog output at audio source. |
| | No audio connection to audio sink (e.g. CPU) | ➔ Check connection to CPU.<br>➔ Check connection of audio cable.<br>➔ Check audio configuration. |

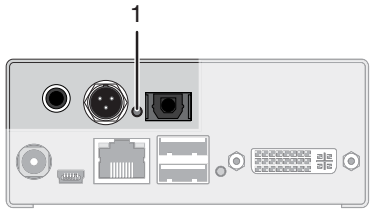
## 8.5 Digital Audio

**CPU Unit**




*Rear View*

**CON Unit**

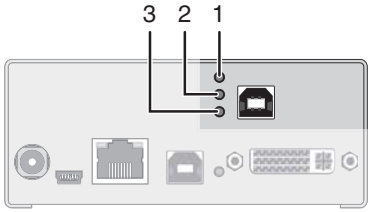



*Rear View*

| Diagnosis | Possible Reason | Measure |
|---|---|---|
| CPU Unit:<br>LED **1** red | No audio connection to CPU / audio source | ➔ Connect digital audio source.<br>➔ Check connection of audio cable. |
| | No signal | ➔ Switch digital audio source on.<br>➔ Activate digital output at CPU / audio source. |
| CON Unit:<br>LED **1** red | No audio connection to audio sink (e.g. speakers) | ➔ Connect digital audio sink.<br>➔ Check connection of audio cable. |
| | No signal | ➔ Check signal at CPU Unit. |
| No signal /<br>LEDs **1** OK | Digital Silence at active audio source | ➔ Check LEDs at CPU Unit.<br>➔ Check audio format.<br>➔ Change audio input. |

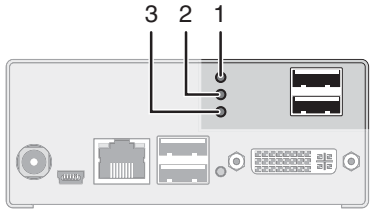
## 8.6 USB-HID Add-On

**CPU Unit**




*Rear View*

**CON Unit**

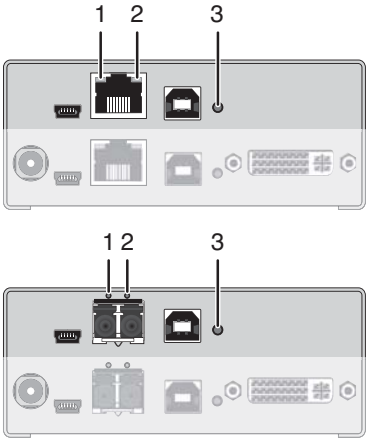



*Rear View*

| Diagnosis | Possible Reason | Measure |
|---|---|---|
| LED **1**/**2** off | Device at higher / lower USB-HID port not detected | ➔ Check connection of USB cable to USB-HID device.<br>➔ Connect USB-HID device.<br>➔ Contact dealer if necessary. |
| CPU Unit:<br>LED **3** off | Connection between CON Unit and CPU Unit | ➔ Check interconnect cable and connectors. |
| CON Unit:<br>LED **3** off | Keyboard in Command Mode | ➔ Press <Esc> to leave Command Mode. |
| CON Unit:<br>LED **3** flashing slowly | Connection between CON Unit and CPU Unit | ➔ Check interconnect cable and connections. |
| | Keyboard in Command Mode | ➔ Press <Esc> to leave Command Mode. |

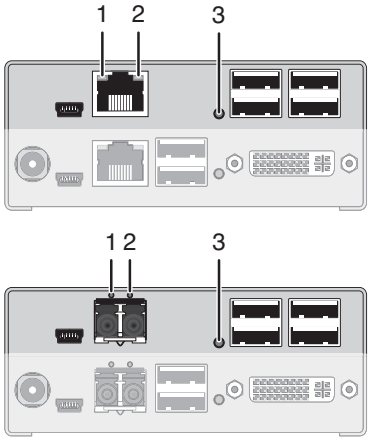
## 8.7 USB 2.0

**CPU Unit**




*Rear View*

**CON Unit**




*Rear View*

| Diagnosis | Possible Reason | Measure |
|---|---|---|
| CPU Unit:<br>All LEDs off | No connection to CPU | ➔ Check connection USB cable to CPU; select another USB port if necessary.<br>➔ Remove USB and power cable and restart CPU. Connect power cable first. |
| CON Unit:<br>LED **3** red | Connection between CON Unit and CPU Unit | ➔ Check interconnect cable and connectors. |
| CON Unit:<br>LED **3** flashing green/turquoise and USB 2.0 device without function | No USB 2.0 device | ➔ Connect USB 2.0 device. |
| | USB 2.0 device is not supported | ➔ Check installation at the CPU, also the necessary drivers,<br>➔ New connection of the USB 2.0 device.<br>➔ Contact dealer if necessary. |

# 9 Technical Support

Prior to contacting support please ensure you have read this manual, and then installed and set-up your KVM Extender as recommended.

## 9.1 Support Checklist

To efficiently handle your request it is necessary to complete our checklist for support and problem cases (Download). Keep the following information available before you call:

- Company, name, phone number and email
- Type and serial number of the device (see bottom of device)
- Date and number of sales receipt, name of dealer if necessary
- Issue date of the existing manual
- Nature, circumstances and duration of the problem
- Involved components (such as graphic source/CPU, OS, graphic card, monitor, USB-HID/USB 2.0 devices, interconnect cable) including manufacturer and model number
- Results from any testing you have done

## 9.2 Shipping Checklist

1. To return your device, contact your dealer to obtain a RMA number (Return-Material-Authorization).
2. Package your devices carefully, preferably using the original box. Add all pieces which you received originally.
3. Note your RMA number visibly on your shipment.

Devices that are sent in without a RMA number cannot be accepted. The shipment will be sent back without being opened, postage unpaid.

# 10 Regulatory and Standards Compliance

## 10.1 CE Declaration Of Conformity

The products listed below in the form as delivered comply with the provisions of the following European Directives:

2004/108/EG Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility

CE Marking 2009

Product list:

K477 Series

The products comply with the following harmonized standards for Information Technology Equipment:

- EN 55022:2006 + A1:2007 (Class A)
- EN 55024:1998 + A1:2001 + A2:2003

This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety instructions and installation guidelines noted in this manual shall be considered in detail. Compliance with the specifications for cable lengths and types is mandatory.

Manufacturer:

IHSE GmbH
Maybachstrasse 11
88094 Oberteuringen
Deutschland

Oberteuringen, 26 January 2010

The Management

**Use in a Domestic Environment**

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

## 10.2 North American Regulatory Compliance

This equipment has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Shielded cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

All power supplies are certified to the relevant major international safety standards.

## 10.3 WEEE

The manufacturer complies with the EC Directive 2002/96/EG on the prevention of waste electrical and electronic equipment (WEEE).

The device labels carry a respective marking.

## 10.4 RoHS

This device complies with the EC Directive 2002/95/EG on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS).

The device labels carry a respective marking.

# 11 Glossary

The following terms are commonly used in this guide or in video and KVM technology:

| Term | Explanation |
|---|---|
| Cat X | Any Cat 5e (Cat 6, Cat 7) cable |
| CGA | The Color Graphics Adapter (CGA) is an old analog graphic standard with up to 16 displayable colors and a maximum resolution of 640x400 pixels. |
| Component Video | The Component Video (YPbPr) is a high-quality video standard that consists of three independently and separately transmittable video signals, the luminance signal and two color difference signals. |
| Composite Video | The Composite Video is also called FBAS and it is part of the PAL TV standard. |
| CON Unit | Component of a KVM Extender or Media Extender to connect to the console (monitor(s), keyboard and mouse; optionally also with USB 2.0 devices) |
| CPU Unit | Component of a KVM Extender or Media Extender to connect to a source (computer, CPU) |
| DDC | The Display Data Channel (DDC) is a serial communication interface between monitor and source (computer, CPU. It allows a data exchange via monitor cable and an automatic installation and configuration of a monitor driver by the operating system. |
| Dual Access | A system to operate a source (computer, CPU) from two consoles |
| Dual-Head | A system with two video connections |
| Dual-Link | A DVI-D interface for resolutions up to 2560x2048 by signal transmission of up to 330 MPixel/s (24-bit) |
| DVI | Digital video standard, introduced by the Digital Display Working Group (http://www.ddwg.org). Single Link and Dual Link standard are distinguished. The signals have TMDS level. |
| DVI-I | A combined signal (digital and analog) that allows running a VGA monitor at a DVI-I port – in contrast to DVI-D (see DVI). |
| Fiber | Single-mode or multi-mode fiber cables |

| Term | Explanation |
|---|---|
| EGA | The Enhanced Graphics Adapter (EGA) is an old analog graphic standard, introduced by IBM in 1984. A D-Sub 9 connector is used for connection. |
| FBAS | The analog color video baseband signal (FBAS) is also called Composite Video and it is part of the PAL TV standard. |
| Console | Keyboard, mouse and monitor |
| KVM | Keyboard, video and mouse |
| Mini-XLR | Industrial standard for electrical plug connections (3 pole) for the transmission of digital audio and control signals |
| Multi-mode | 62.5µ multi-mode fiber cable or 50µ multi-mode fiber cable |
| OSD | The On-Screen-Display is used to display information or to operate a device. |
| Quad-Head | A system with four video connections |
| RCA (Cinch) | A not standardized plug connection for transmission of electrical audio and video signals, especially with coaxial cables |
| SFP | SFPs (Small Form Factor Pluggable) are pluggable interface modules for Gigabit connections. SFP modules are available for Cat X and fiber interconnect cables. |
| Single-Head | A system with one video connection |
| Single Link | A DVI-D interface for resolutions up to 1920x1200 by signal transmission of up to 165 MPixel/s (24-bit).<br>Alternative frequencies are Full HD (1080p), 2K HD (2048x1080) and 2048x1152. |
| Single-mode | 9µ single-mode fiber cable |
| S-Video (Y/C) | The S-Video (Y/C) is a video format transmitting luminance and chrominance signals separately. Thereby it has a higher quality standard than FBAS. |
| TOSLINK | Standardized fiber connection system for digital transmission of audio signals (F05 plug connection) |
| Triple-Head | A system with three video connections |

| Term | Explanation |
|---|---|
| USB-HID | USB-HID devices (Human Interface Device) allow for data input.<br>There is no need for a special driver during installation; "New USB-HID device found" is reported.<br>Typical HID devices include keyboards, mice, graphics tablets and touch screens. Storage, video and audio devices are **not** HID. |
| VGA | Video Graphics Array (VGA) is a computer graphics standard with a typical resolution of 640x480 pixels and up to 262,144 colors. It can be seen as a follower of the graphics standards MDA, CGA and EGA. |